

National Park Service
U.S. Department of Interior



Big Bend National Park
Texas

Develop New Drinking Water System – Rio Grande Village

Environmental Assessment

Assessment of Effect

September 2006



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ENVIRONMENTAL ASSESSMENT/ASSESSMENT OF EFFECT

Develop New Drinking Water System – Rio Grande Village

Big Bend National Park - Brewster County, Texas

SUMMARY

The National Park Service (NPS) at Big Bend National Park (BBNP) is proposing to replace a water supply system to meet the requirements for a safe and reliable water source at one of its developed areas. The proposed project includes conversion of a recently drilled deep test well and construction of a chlorination building, all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system.

The Rio Grande Village (RGV) developed area contains the park's largest campground and only recreational vehicle (RV) campground. The developed area also includes a concessionaire-operated camper's store with shower and laundry facilities, and an employee housing area for concessionaire and park employees. The RGV developed area currently uses a hot spring (Spring 4) as its water supply. In addition to supplying potable water for RGV, Spring 4 also provides water for the Big Bend mosquitofish (*Gambusia gaigei*), a federally listed endangered species. The *Big Bend Gambusia Recovery Plan* prepared for the U.S. Fish and Wildlife Service (USFWS) by the Rio Grande Fishes Recovery Team sets goals and objectives to preserve the Big Bend mosquitofish and its habitat (USFWS 1984). Continued use of the hot spring for potable water could decrease available flows for this endangered fish species. The Big Bend National Park Final General Management Plan/Environmental Impact Statement (GMP/EIS) also stipulates that the park would upgrade the water and wastewater treatment systems at Chisos Basin, as well as water treatment systems at Panther Junction and RGV that do not meet the Texas Commission on Environmental Quality's (TCEQ) standards or are in a deteriorated condition (NPS 2004).

This environmental assessment (EA) analyzes two alternatives with respect to their environmental impacts: 1) the no action alternative, which is to leave the existing hot spring (Spring 4) as the water supply for the RGV developed area; and 2) the NPS preferred alternative, which is to replace Spring 4 as the water source for the RGV developed area with a recently drilled deep test well that would be converted to the water supply well. Under the preferred alternative, the chlorinator currently located at the Spring 4 springbox would be removed. However, the existing water pipeline, springbox, and pumps would remain in case they need to be used in the future as an emergency back-up system.

The preferred alternative would have no or negligible impacts on air quality; floodplains; biotic communities; geology/topography; prime and unique farmlands; cultural landscapes; historic structures; ethnographic resources; Indian Trust resources; museum objects, collections, and archives; soundscape management; lightscape management; visual resources; visitor use and experience; park operations; land use, health and safety; hazardous materials; waste management; traffic; socioeconomic environment; and environmental justice. The preferred alternative would have short-term, negligible to minor, localized, adverse impacts on soils, water resources (including wetland habitat), vegetation, and wildlife. The preferred alternative would have long-term, minor to moderate, localized, beneficial impacts on water resources, including wetland habitat, vegetation, and wildlife; but long-term, localized, negligible to minor, adverse effects on soils and long-term, localized, minor to moderate, adverse effects to any newly discovered archeological resources. The preferred alternative would have no short-term impacts on the Big Bend mosquitofish. The preferred alternative would benefit the federally listed Big Bend mosquitofish over the long term and would be consistent with the conservation and recovery objectives for the species as outlined in the *Big Bend Gambusia Recovery Plan* (USFWS 1984). The preferred alternative is anticipated to result in negligible to minor, localized, adverse impacts on the common black hawk (a state-listed

threatened species) in the short term. Localized, minor, beneficial impacts on the common black hawk would be anticipated over the long term. No impairment of the park resources would occur under the preferred alternative.

This document includes an assessment of effect on cultural resources under Section 106 of the National Historic Preservation Act. A Section 106 summary is included in the impact analysis section for archeological resources under the preferred alternative. An assessment of effect was submitted to the State Historic Preservation Officer (SHPO) by the park. The NPS received a concurrence on July 6, 2006 from the SHPO that there would be *no historic properties affected* and that the project may proceed as planned with appropriate monitoring by the park archaeologist (Appendix B). Therefore, the finding of assessment of effect is *no historic properties affected*. Therefore, the finding of assessment of effect is *no adverse effect*.

NOTE TO REVIEWERS AND RESPONDENTS

If you wish to comment on the environmental assessment/assessment of effects, you may mail comments to the name and address below. This environmental assessment/assessment of effects can be accessed through the National Park Service Planning, Environment, and Public Comment (PEPC) website. This environmental assessment/assessment of effects can be viewed or downloaded and your comments can be submitted on the PEPC website, <http://parkplanning.nps.gov/parkHome.cfm?parkId=29>. This environmental assessment/assessment of effect will be on public review for 30 days. Please provide your comments by October 29, 2006. It is the practice of the NPS to make comments, including names, home addresses, home phone numbers, and email addresses of respondents, available for public review. Individual respondents may request that we withhold their names and/or home addresses, etc., but if you wish us to consider withholding this information you must state this prominently at the beginning of your comments. In addition, you must present a rationale for withholding this information. This rationale must demonstrate that disclosure would constitute a clearly unwarranted invasion of privacy. Unsupported assertions will not meet this burden. In the absence of exceptional, documentable circumstances, this information will be released. We will always make submissions from organizations for businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

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ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effect
BBNP	Big Bend National Park
BMPs	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	NPS Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
EFS	Environmental Screening Form
EPA	United States Environmental Protection Agency
EO	Executive Order
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GMP	General Management Plan
GPM	Gallons Per Minute
MCL	Maximum Contaminant Level
MG/L	Milligrams Per Liter
MOA	Memorandum of Agreement
MPA	Microscopic Particulate Analysis
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
PEPC	Planning Environment and Public Comment
RCRA	Resource Conservation and Recovery Act
RGV	Rio Grande Village
RV	Recreational Vehicle
SARA	Superfund Amendments and Reauthorization Act
SMCL	Secondary Maximum Contaminant Levels
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPWD	Texas Parks and Wildlife Division
USC	United States Code
USFWS	United States Fish and Wildlife Service
VA	Value Analysis
WRD	Water Resources Division

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INTRODUCTION

PURPOSE AND NEED FOR ACTION

Purpose

The National Park Service (NPS) at Big Bend National Park (BBNP) is proposing to replace a water supply system to meet the demands for a safe and reliable water source at one of its developed areas. The proposed project includes conversion of a recently drilled deep test well and construction of a chlorination building, all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system. Figure 1 provides a vicinity map of the project area within the regional context of the park and surrounding area.

Need

The Rio Grande Village (RGV) developed area encompasses the park's largest campground and only recreational vehicle (RV) campground. The developed area also includes a concessionaire-operated camper's store with shower and laundry facilities and an employee housing area for concessionaire and park employees. The RGV developed area currently uses a hot spring (Spring 4) as its water supply. This spring is subject to seasonable fluctuations based on time of year, precipitation, and drought conditions. A more reliable water supply source for the RGV developed area is needed.

In addition to supplying potable water for RGV, Spring 4 also provides water for the Big Bend mosquitofish (*Gambusia gaigei*). The entire wild population of the federally endangered Big Bend mosquitofish exists in only three small spring-fed ponds located in the vicinity of the RGV Campground in the southeast corner of the park: Spring 1; Spring 4; and a natural beaver pond. Spring 4 provides habitat for more than 50 percent of the Big Bend mosquitofish population and one of only two genetic reservoirs. Therefore, the species depends on this temperate water source for its viability. Continued use of the Spring 4 hot spring for potable water could decrease available flows for this endangered fish species.

An environmental assessment (EA) analyzes the preferred alternative and other alternatives and their impacts on the environment. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1508.9) and National Park Service Director's Order (DO)-12: *Conservation Planning, Environmental Impact Analysis* (NPS 2001).

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Big Bend National Park

Vicinity Map

National Park Service
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Legend

- Big Bend National Park
- Rosillos Ranch (private)
- Counties
- Mexico
- Towns

- Visitor Center
- Campground
- Access Point
- River
- Stream or Creek

- Highway
- Campsite Road
- Dirt Road
- Trail



Big Bend National Park

Source: NPS, 2004

Figure 1. Project Vicinity Map

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PARK PURPOSE, SIGNIFICANCE, AND MISSION

An essential part of the planning process is to understand the purpose, significance, and mission of the park for which the EA is being prepared.

Purpose statements are based on legislation, legislative history, and NPS policies. The statements reaffirm the reasons for which the park was set aside as a unit of the National Park System, and provide the foundation for the management and use of the park.

The park is significant because it contains the most representative example of the Chihuahuan Desert ecosystem in the United States. The NPS at BBNP preserves and protects this representative area of the Chihuahuan Desert along the Rio Grande for the benefit and enjoyment of present and future generations. The park includes rich biological and geological diversity, cultural history, recreational resources, and outstanding opportunities for binational protection of shared resources between Mexico and the United States.

The purpose of BBNP is to:

- Preserve and protect all natural and significant cultural resources and values.
- Provide recreational opportunities that are compatible with the protection and appreciation of park resources for diverse groups.
- Provide educational opportunities to foster understanding and appreciation of the natural and human history of the region.

Other legislation affecting the National Park System, such as the 1916 Organic Act, the Wilderness Act, NEPA, the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA), also influence management decisions at BBNP.

PROJECT BACKGROUND, PREVIOUS PLANNING, SCOPING, AND VALUE ANALYSIS

Project Background

The RGV developed area has used a portion of the Spring 4 water supply since the late 1950s. Spring 4 also provides water for the Big Bend mosquitofish. Since it was listed as endangered in 1967, projects designed to modify spring outflows have been cognizant of Big Bend mosquitofish habitat requirements. The *Big Bend Gambusia Recovery Plan* has recognized that excess water not needed for the fish could be used for domestic use in the campground, but priority should be placed on habitat for the fish (USFWS 1984). Continued use of the Spring 4 hot spring for potable water could decrease available flows for this endangered fish species. Development of a new source for domestic water use for the RGV developed area would: provide an adequate, reliable, and safe water supply that meets all state and national primary drinking water standards; alleviates demands on Spring 4; and allows for more water to flow to natural habitats. The Big Bend National Park GMP/EIS also stipulates that the park would upgrade the water and wastewater treatment systems at Chisos Basin, as well as water treatment systems at Panther Junction and RGV that do not meet the Texas Commission on Environmental Quality's (TCEQ) standards or are in a deteriorated condition (NPS 2004).

Three test wells were drilled to provide information regarding the quantity and quality of groundwater available in the area and to assess the suitability of a location for construction of a water supply well to meet the public water needs of the RGV developed area. NEPA compliance for drilling of these test wells was covered under Categorical Exclusions conducted in 2004. The first test well (Test Well 1) was located approximately 300 feet south of an employee residence near the maintenance area. The pilot hole for this

well was drilled to a depth of 300 feet with very little water encountered. Consequently, the hole was filled and a second test well (Test Well 2) was constructed.

Test Well 2 was located northwest of the RGV visitor center. The well was tested at an average flow rate of 55 gallons per minute (gpm). Based on these results, it was determined that a production well completed at this location should be able to sustain a long-term yield of 30 to 35 gpm for the foreseeable future (ARCADIS 2004). However, the water quality analytical data from this well indicated that concentrations of chloride, sulfate, manganese, and Total Dissolved Solids (TDS) at this location were above the U.S. Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ) secondary standards, the groundwater was possibly under the direct influence of surface water, and that the water was extremely hard (contains an appreciable quantity of dissolved minerals). In view of the poor water quality, excessive treatment would be needed to soften the water, provide adequate treatment for groundwater under the direct influence of surface water, and to reduce the concentrations of chloride, sulfate, manganese, and TDS (ARCADIS 2004).

The third test well (Test Well 3) is located approximately 1,100 feet east of the existing water storage tank. National Environmental Policy Act (NEPA) compliance for drilling of this test well was covered under a Categorical Exclusion (C.3.4[11]) signed by the park on October 1, 2004. The well was tested at an average flow rate of 15 gpm during a 36-hour flow. Based on these results, it was determined that a production well completed at this location should be able to sustain a long-term yield of 15 gpm or more if the pump is set deeper (ARCADIS 2005a). During the pump test of the third test well, monitoring in test wells around Spring 4 showed no significant affect on the water level of the aquifer around the spring (NPS 2005). The NPS would continue to monitor the effect of the well's use on the spring, and would modify use of the well if a decrease in the water levels of the surrounding natural springs is observed. Analytical data for the Test Well 3 indicates that concentrations of sulfate and TDS at this location are above the EPA secondary drinking water standards. The sulfate concentration is also above the TCEQ secondary drinking water standard. The fluoride concentration is above the EPA and TCEQ secondary drinking water standards, but meets the primary standard. Other constituents meet the EPA and TCEQ primary and secondary standards.

This well could be converted to use for a public water supply with construction of the wellhead and surface improvements (ARCADIS 2005a).

Previous Planning

The proposed project would replace the water supply for the RGV developed area to: 1) provide an adequate, reliable, and safe water supply for the RGV developed area that meets all state and national primary drinking water standards; and 2) accrue the advantages of greater available water supply for the endangered Big Bend mosquitofish. This project would comply with the mission and goals of the BBNP GMP/EIS (NPS 2004). One of those goals is to preserve and protect the rich biological diversity of the park. Other laws and policies that are relevant to the proposed project and are outlined in the GMP/EIS (NPS 2004) require that the following conditions be achieved in the park:

- Surface water and groundwater will be restored or enhanced.
- NPS and NPS-permitted programs and facilities will be maintained and operated to avoid pollution of surface water and groundwater.

In addition, the *Big Bend Gambusia Recovery Plan* sets goals and objectives to preserve the Big Bend mosquitofish and its habitat. The ultimate goal of the *Big Bend Gambusia Recovery Plan* is to secure survival of the Big Bend mosquitofish in a natural setting (USFWS 1984). This project would comply with the goal established by the *Big Bend Gambusia Recovery Plan*.

Scoping

Scoping is an effort to involve agencies and the general public in determining issues to be addressed in this EA. Scoping is used to:

- Determine important issues to be analyzed in detail in the EA and eliminate issues not requiring detailed analysis.
- Allocate assignments among the interdisciplinary team members and/or other participating agencies.
- Identify related projects and associated documents.
- Identify permits, surveys, consultations, etc. required by other agencies.
- Create a schedule that allows adequate time to prepare and distribute the EA for public review and comment before a final decision is made.

Scoping includes any interested agency or any agency with jurisdiction by law or expertise to obtain early input.

An Environmental Screening Form (ESF) was completed for this project by BBNP resource professionals in March 2005 and can be found in the administrative record for this EA. The ESF identified potential resource effects from the proposed project to consider. Internal scoping was conducted by the staff of BBNP and resource professionals of the NPS Denver support office on April 26 and 27, 2006. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, and determined what the likely issues and impact topics would be. To satisfy public scoping requirements for this project, scoping letters were mailed requesting public and agency input on issues to be addressed in the EA (Appendix A). Table A-1 in Appendix A lists all persons and agencies/organizations to whom the scoping letters were sent. A news release was sent to more than 60 media outlets including newspapers, radio stations, and TV stations and was also posted on the Big Bend National Park's website under 'News' at <http://www.nps.gov/bibe/pphtml/newsdetail21717.html>. A copy of the news release is located in Appendix A.

The NPS also consulted with many state and federal agencies regarding the project as summarized in the *Consultation and Coordination* section in this EA.

The public scoping period for the project ended on March 7, 2006. No comments were received from the public regarding this project. Two comments were received from state agencies. Appendix B presents copies of the comment letters from the TCEQ and the Texas Parks and Wildlife Division (TPWD).

Value Analysis

A value analysis (VA) was performed during the concept phase of the project. The objective of the VA study was to examine alternatives (including water well locations) for the elements of the project; to ensure that a wide range of alternative proposals was considered; and to ensure that each element of the project satisfied the user's needs at the lowest life cycle cost while maintaining quality, reliability, sustainability, and function in the context of criteria that relates directly to NPS service-wide goals and objectives.

The location of infrastructure for the different alternatives was analyzed including treatment, location of wastewater evaporation ponds, pipeline routes, and power line routes.

Four water supply alternatives were evaluated through the "Choosing by Advantages" process in the final evaluation phase. These alternatives include:

- Use water from warm aquifer well;
- Use existing spring with additional treatment;
- Build a pipeline from Panther Junction; and
- Truck water from Panther Junction.

Each alternative was evaluated using water supply location, flow rate, and water quality as design criteria. The value analysis study team reviewed the study results and recommended the use of well water from a warm aquifer well located at the area where Test Well 3 was subsequently drilled. Therefore, only alternatives associated with the use of water from a warm aquifer well were analyzed.

ISSUES AND IMPACT TOPICS

Issues

Issues and concerns affecting this proposed action were identified by specialists at BBNP and input from state and federal agencies. The TCEQ stated that the proposed action is located in Brewster County, which is currently unclassified or in attainment of the National Ambient Air Quality Standards (NAAQS) for all six criteria air pollutants. Therefore, general conformity does not apply. The TCEQ also stated that any minimal dust and particulate emissions could be easily controlled by the construction contractors using standard dust mitigation techniques. The TCEQ recommended that the EA address actions that will be taken to prevent surface and groundwater contamination. In addition, the TCEQ recommended that care should be taken to ensure that the proposed construction takes into account the possible Flood Hazard Areas within the community's floodplains.

The TPWD recommended that the EA clearly identify:

- The location of the new water treatment facility;
- The source of groundwater and potential for impacts to the spring water source (hydrogeologic connectivity);
- The area to be disturbed by the construction of the chlorination building and distribution pipelines; and
- The potential for sensitive plants and animals in the project area and mitigation measures that will be followed to avoid impacts to them.

The TPWD also provided a list of sensitive species potentially occurring in Brewster County.

Specific impact topics were developed for discussion focus and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on: federal law, regulations, and executive orders; NPS *Management Policies 2001* (NPS 2000a); and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific impact topics from further consideration.

Impact Topics Included in this Document

Soils

Under the preferred alternative, construction activities such as excavation, grading, trenching, and use of heavy equipment during construction would disturb soils and potentially cause soil compaction and erosion at the project site. Therefore, soils are addressed as an impact topic in this EA.

Water Resources, Including Wetland Habitat

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy: to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. NPS *Management Policies 2001* (NPS 2000a) provide direction for the preservation, use, and quality of water in national park units. The preferred alternative has the potential to affect the quality of water resources in the project area.

Executive Order 11990, Protection of Wetlands, requires an examination of impacts to and protection of wetlands. The NPS *Management Policies 2001* (NPS 2000a), Section 4.6.5, Wetlands, and DO 77-1, Wetland Protection (NPS 2002), provide guidelines on developments proposed in wetlands. The preferred alternative involves construction and installation of a water pipeline underneath and adjacent to an existing road. A wetland exists near Spring 1 and the Gambusia well, on the north side of the existing paved service road. The pipeline would avoid the wetland near Spring 1 and the Gambusia well. Another potential wetland area exists where the existing gravel road meets the paved service road in the southeast portion of the project area, northwest of the Berkley Cottage. This potential wetland area has not been delineated by the NPS Water Resources Division. Soils in this area are listed as occasionally flooded (NRCS 2006). The pipeline would be buried underneath the existing road and is not expected to disturb wetland hydrology, soils, or vegetation in this area. In addition, trench construction in this area is recommended to be conducted during the dry period (April to July) to limit the amount of trench dewatering needed for trench construction.

Potential impacts to water resources, including wetland habitat, from development of the Santa Elena well may include changes in groundwater quantity and alteration of flow to local springs and wetlands. Continuing diversion of a portion of the spring flow for the water supply could affect the local hydrology by reducing the flows available for local water features including the beaver pond. The TCEQ has also expressed concerns that Spring 4 is possibly under the direct influence of surface water. Wetland habitat and water resources could be impacted by either alternative. Therefore, water resources, including wetland habitat, are addressed as an impact topic in this EA.

Vegetation

The preferred alternative would involve ground-disturbing activities that have the potential to affect vegetation. Some vegetation would be removed during construction and installation of the water pipeline and chlorination building. Disturbance from construction could increase the potential for establishment and spread of non-native plants. Impacts on vegetation would occur under the no action alternative from the possible loss or reduction of wetland/riparian vegetation. Therefore, vegetation is addressed as an impact topic in this EA.

Wildlife

National Park Service policy is to protect the components and processes of naturally occurring biotic communities including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2000a). Wildlife habitat may be affected by the preferred alternative as a result of disturbance to vegetation and the potential for establishment and spread of non-native plants. In addition, construction noise and activity may disturb wildlife inhabiting or migrating through the project area. Impacts on wildlife may occur under the no action alternative if diversion of a portion of the spring flow for water supply continues, resulting in the loss or reduction of the associated aquatic and wetland habitat. Therefore, wildlife is addressed as an impact topic in this EA.

Threatened, Endangered, Candidate, and Sensitive Species

The Endangered Species Act (1973), as amended, requires an examination of impacts to all federally listed threatened or endangered species. NPS policy also requires examination of the impacts to federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. The U.S. Fish and Wildlife Service (USFWS) was contacted to request lists of any threatened, endangered, candidate, and sensitive species. No federally listed threatened, endangered, candidate, or state-listed sensitive species of plants are located within the project area (Sirotnak 2006).

The Big Bend mosquitofish, a federally listed endangered species, is found nowhere else in the wild other than the ponds near the project area. The entire wild population of the Big Bend mosquitofish exists in only three small spring-fed ponds located in the vicinity of the RGV Campground in the southeast corner of the park: Spring 1, Spring 4, and a natural beaver pond. The TPWD responded to the scoping letter on March 30, 2006 (Appendix C) and included a list of sensitive species potentially occurring in Brewster County. The common black hawk (*Buteogallus anthracinus*) is a state-listed threatened species and is known to nest in the vicinity of the project area. The preferred alternative has the potential to affect this species through alteration of habitat or disturbance during construction. The no action alternative may impact the federally endangered Big Bend mosquitofish and the state-listed threatened common black hawk and associated habitats in the park. Therefore, threatened, endangered, candidate, and sensitive species are addressed as an impact topic in this EA.

Archeological Resources

The NHPA (16 USC 470 *et seq.*), NEPA, NPS 1916 Organic Act, NPS *Management Policies 2001* (NPS 2000a), DO-12 (*Conservation Planning, Environmental Impact Analysis and Decision-making*) (NPS 2001), and NPS-28 (*Cultural Resources Management Guideline*) (NPS 1998) require the consideration of impacts to any cultural resources that might be affected; and NHPA, in particular, on cultural resources either listed in, or eligible to be listed in, the National Register of Historic Places (NRHP). Cultural resources include archeological resources; cultural landscapes; historic structures and districts; ethnographic resources; and museum objects, collections, and archives.

Archeological resources are the remains of past human activity and records documenting the scientific analysis of the remains. A survey of archeological resources was conducted by Tom Alex, BBNP Archeologist, within the project area on June 28, 2004; January 24, 2006; February 1, 2006; and April 26, 2006. There are some prehistoric lithic (stone) scatters that would be crossed by the proposed power line and near the proposed chlorination building location. The Archeologist has staked these locations, and they will be avoided by the preferred alternative. Disturbance from construction could increase the potential for disturbance to unknown subsurface archeological resources within the project area. Therefore, archeological resources are addressed as an impact topic in this EA.

Impact Topics Dismissed from Further Consideration

NEPA regulations emphasize the importance of adjusting the scope of each EA to the particulars of the project and its setting and focusing on the specific potential impacts of that project. There is no need, according to the regulations, to include information for resources that would not be affected by the project. As a result, different EAs will discuss somewhat different lists of resources. The rationale for dismissing specific impact topics from further consideration for this EA is given below.

Air Quality

Section 118 of the 1963 Clean Air Act (CAA) requires the park to meet all federal, state, and local air pollution standards. Section 176(c) of the 1963 CAA requires all federal activities and projects to conform to state air quality implementation plans to attain and maintain NAAQS. *NPS Management Policies 2001* (NPS 2000a) addresses the need to analyze potential impacts to air quality during park planning.

Big Bend National Park is classified as a Class I air quality area under the CAA, as amended. This most stringent air quality classification protects national parks and wilderness areas from air quality degradation. The CAA gives federal land managers the responsibility for protecting air quality and related values including visibility, plants, animals, soils, water quality, cultural resources, and public health from adverse air pollution impacts.

TCEQ stated that the proposed action is located in Brewster County, which is currently unclassified or in attainment of the NAAQS for all six criteria air pollutants (Appendix B). Therefore, general conformity does not apply. The TCEQ also stated that any minimal dust and particulate emissions could be easily controlled by the construction contractors using standard dust mitigation techniques. Conversion of a recently drilled deep test well to a water supply well and construction of the associated infrastructure would have a negligible, short-term, localized impact on air quality due to dust generated from construction activities and emissions from construction equipment. These effects would last only as long as construction occurred and would not affect the park's Class I air quality and related values. None of the alternatives analyzed would have impacts greater than negligible. Therefore, air quality was dismissed as an impact topic in this EA.

Floodplains

Executive Order 11988, *Floodplain Management*, requires all federal agencies to take action to reduce the risk of flood loss, to restore and preserve the natural and beneficial values served by floodplains, and to minimize the impact of floods on human safety, health, and welfare. According to the Federal Emergency Management Agency Flood Insurance Rate Map (FEMA 1985), a small portion of the water pipeline (approximately 280 feet) under the preferred alternative is located inside the 100-year floodplain. The majority of the project area; including the portions that contain the proposed chlorination building, power line, road, and most of the water pipeline; is located outside of the 100-year floodplain. The portion of the water pipeline within the 100-year floodplain would be located along the existing park maintenance road in this area. Construction would not alter the topography of the land, and the 100-year floodplain would not be altered.

None of the alternatives analyzed would have an effect on floodplains. Therefore, floodplains were dismissed as an impact topic in this EA.

Biotic Communities

The NEPA calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park unit ecosystems including the natural abundance, diversity, and ecological integrity of plants and animals.

Although minor, localized impacts to vegetation, wildlife, or water resources could occur as a result of the proposed action, impacts are not expected to extend outside of the immediate project area. None of the alternatives presented involve significant disturbance of native ecosystems at the overall biotic community level. The project area has been disturbed multiple times in the past by road, pipeline, and water storage tank construction. Any small disturbed areas resulting from the proposed action would be reclaimed with native vegetation and would soon re-colonize with native micro- and meso-fauna similar to that currently existing. The scope, duration, and intensity of these effects are considered negligible. None of the alternatives analyzed would have impacts greater than negligible on biotic communities. Therefore, biotic communities were dismissed as an impact topic in this EA.

Geology/Topography

National Park Service's *Management Policies 2001* (NPS 2000a) require the protection of significant geologic and topographic features. Big Bend National Park is in the southern portion of Brewster County adjacent to the international border with Mexico. The regional topography is characterized by a long geological record of change from Paleozoic mountain ranges to being covered by Cretaceous-age seas; to Laramide Basin and Range faulting and to Tertiary-age igneous and volcanic upheaval. Cretaceous and Tertiary fossils exist in variety and abundance. None of the alternatives presented would have an effect on these resources. Therefore, geology and topography were dismissed as an impact topic in this EA.

Prime and Unique Agricultural Lands

In August 1980, CEQ directed that federal agencies assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) as prime or unique. Prime farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed. Unique farmland produces specialty crops such as fruits, vegetables, and nuts. The proposed project is exempt from the requirements of the Farmland Protection Policy Act (FPPa) because there are no prime farmlands associated with the project area, and there are no potential impacts that would directly affect wetland areas associated with agriculture. None of the alternatives presented would have an effect on this resource. Therefore, prime and unique agricultural lands were dismissed as an impact topic in this EA.

Cultural Landscapes

According to the National Park Service's *Cultural Resource Management Guideline* (DO-28) (NPS 1998), a cultural landscape is:

“...a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.”

Thus, cultural landscapes are the result of the long interaction between man and the land – the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land use and management practices as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past – a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes; making them good sources of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

The Mission 66 program was a large-scale development program initiated by the NPS to improve park infrastructure and interpretation opportunities for the ever-increasing number of visitors. The program was initiated in 1956 with the goal of completing the improvements in time for the NPS anniversary in 1966. As part of the Mission 66 program, a flurry of construction took place in the developed area at Panther Junction, RGV, and the Chisos Basin.

The NPS recognizes that, while not yet 50 years old as generally required under the National Register standards, Mission 66 development may have historical significance. A reconnaissance visit to the park by architectural historian Ethan Carr resulted in the opinion that Big Bend's Mission 66 designed landscape is prototypical of the Mission 66 era. In lieu of having designated Mission 66 Cultural Landscape, the NPS must consider all components of the designed landscape as potentially eligible until determined otherwise.

The design of the chlorination building would incorporate Mission 66 architectural principles, but would be visually identifiable as a non-historic construction. The overall character of the Mission 66 developed area landscape would not be altered. The chlorination building is a one-story building, measuring approximately 22 feet by 32 feet. The building will be split-face concrete block with a metal roof, and the colors will be selected to blend with the surrounding landscape. The metal roof will slope to the east to limit glare reflection towards the main road to the northwest. A hill conceals sight of much of the building from the main park road. It could only be observed from a short section of the main park road south of the tunnel. The preferred alternative would not alter the topography, circulation features, spatial organization, or use patterns of the landscape, and any adverse impacts associated with construction of the chlorination building would be long-term but negligible. In addition, any visual, audible, and atmospheric intrusions associated with construction would be temporary and negligible, lasting only as long as construction. None of the alternatives presented would have an effect on this resource.

The NPS consulted with the Texas Historical Commission regarding the proposed project in a letter dated June 14, 2006. The NPS received a concurrence on July 6, 2006 from the State Historic Preservation Officer (SHPO) that there would be *no historic properties affected* and that the project may proceed as planned with appropriate monitoring by the park archaeologist (Appendix B). This concurrence included the SHPO's review of cultural landscapes within the park. Therefore, cultural landscapes were dismissed as an impact topic.

Historic Structures

The Berkeley Cottage site is located near the proposed water pipeline where it bends above the project site and is not considered eligible for the NRHP. The site would not be impacted by the project (Alex 2006a). In addition, the NPS consulted with the Texas Historical Commission regarding the proposed project in a letter dated June 14, 2006. The NPS received a concurrence on July 6, 2006 from the SHPO that there would be *no historic properties affected* and that the project may proceed as planned with appropriate monitoring by the park archaeologist (Appendix B). None of the alternatives presented would have an effect on this resource. Therefore, historic structures were dismissed as an impact topic in this EA.

Ethnographic Resources

According to NPS-28, *Cultural Resource Management Guideline*, an ethnographic resource is any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS 1998). Archeological surveys conducted within the project area by the park archeologist did not identify any potential ethnographic resources or American Indian religious sites within the project area.

There are no known ethnographic sites in the project area. Copies of the EA will be forwarded to each associated tribe for review and comment. If the tribes subsequently identify the presence of ethnographic resources, then appropriate mitigation measures would be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. Because there are no known ethnographic resources within the project area, ethnographic resources was dismissed as an impact topic.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian tribes and Alaska Native entities. There are no Indian trust resources in Big Bend. None of the alternatives presented would have an effect on Indian trust resources. Therefore, Indian trust resources were dismissed as an impact topic in this EA.

Museum Objects, Collections, and Archives

Museum objects are material things possessing functional, aesthetic, cultural, symbolic, and/or scientific value that include prehistoric and historic objects, artifacts, art, archival documents, and natural history specimens that are part of museum collections (NPS 1998). None of the alternatives presented would have an effect on museum objects, collections, and archives. Therefore, museum objects, collections, and archives were dismissed as an impact topic in this EA.

Soundscape Management

In accordance with NPS *Management Policies 2001* (2000a) and DO-47, *Sound Preservation and Noise Management* (NPS 2000b), an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units and potentially within each park unit, are generally higher in developed areas and lower in undeveloped areas.

The proposed water well location under the preferred alternative is approximately 0.4 miles from the RGV developed area and is east of the large hill where the water storage tank is located. Noise emitted from the well during pumping would not be heard in the RGV developed area. Any adverse impacts associated with the noise emitted from the well during pumping would be long-term but negligible.

Hauling material, operating equipment, and other construction activities could result in dissonant, human-caused sounds. Any sounds associated with construction would be temporary, lasting only as long as the construction activity generating the sound, and would negligibly impact visitor enjoyment of the park. Construction-related sounds would have adverse but short-term and negligible impacts on visitor enjoyment of the park. None of the alternatives analyzed would have impacts greater than negligible on soundscape management. Therefore, soundscape management was dismissed as an impact topic in this EA.

Lightscape Management

In accordance with the NPS *Management Policies 2001* (2000a), the NPS strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. Big Bend National Park strives to limit the use of artificial outdoor lighting to that which is necessary for basic safety requirements and to ensure that all outdoor lighting is shielded to the maximum extent possible to keep light on the intended subject and out of the night sky.

None of the alternatives would require additional lighting. There would be no outdoor lighting associated with the chlorination building. None of the alternatives presented would have an effect on lightscape management. Therefore, lightscape management was dismissed as an impact topic in this EA.

Visual Resources

The project includes construction of a chlorination building (one-story building measuring 20 by 30 feet), all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system. During construction, effects would result from the presence of temporary fencing, construction equipment, and dust; however, the effects would be short-term, localized, and negligible. A fence would surround the new water well. An electrical panel would be located inside the fenced area. However the proposed water well location would not be visible from the RGV developed area. The chlorination building and radio telemetry system would not be visible from most of the RGV developed area, including the visitor center and campground. The chlorination building is a one-story building, measuring approximately 22 feet by 32 feet. The building will be split-face concrete block with a metal roof, and the colors will be selected to blend with the surrounding landscape. The metal roof will slope to the east to limit glare reflection towards the main road to the northwest. A hill conceals sight of much of the building from the main park road. It could only be observed from a short section of the main park road south of the tunnel. Any adverse visual impacts associated with the location of the chlorination building would be long-term but negligible. None of the alternatives analyzed would have impacts greater than negligible on visual resources. Therefore, visual resources were dismissed as an impact topic in this EA.

Visitor Use and Experience

Big Bend National Park is open year-round. The park averages between 300,000 and 340,000 visitors (and has been as high as 474,000) per year. The high periods of visitation occur at holidays throughout the year, with major peaks in November and December and in the school spring break season. Visitor use reaches a climax during the spring break period and tapers off after Easter. The average length of stay in the park is 3 days (NPS 2004). Under the preferred alternative, the chlorination building, all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and the radio telemetry system would be constructed in an area that limits public access via park signage and a locked gate. This area is only open to park employees. In addition, the construction period is expected to occur in the summer when visitor use is typically at its lowest. Visitors to the RGV developed area during construction may observe temporary fencing, construction equipment, and dust; however, the effects would be short-term, localized, and negligible.

Under the preferred alternative, use of the well would provide an adequate, reliable, and safe water supply for the RGV developed area that meets all state and national primary drinking water standards. None of the alternatives analyzed would have impacts greater than negligible on visitor use and experience. Therefore, visitor use and experience was dismissed as an impact topic in this EA.

Park Operations

Park operation of the existing spring would continue under the no action alternative. Under the preferred alternative, with the installation of the radio telemetry system, water quantity and quality could be monitored remotely on a daily basis. This would decrease the current park operation effort. Park operations in the area of construction would experience short-term, localized, and negligible effects. However, the preferred alternative would provide a long-term, beneficial effect for park operations within the RGV developed area. None of the alternatives analyzed would have impacts greater than negligible on park operations. Therefore, park operations were dismissed as an impact topic in this EA.

Land Use

Neither the no action nor preferred alternative would change the land use within the project area from existing uses as vacant and facilities/utilities land. NPS would continue to manage the project area under current management policies. None of the alternatives presented would have an effect on land use. Therefore, land use was dismissed as an impact topic in this EA.

Health and Safety

Under the preferred alternative, the chlorination building, all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and the radio telemetry system would be constructed in an area that is currently restricted to visitors. This area is only open to park employees. In addition, the construction period is expected to occur in the summer when visitor use is typically at its lowest. Therefore, the health and safety of visitors would not be affected by construction under the preferred alternative.

Conversion of the Test Well 3 would provide an adequate, reliable, and safe water supply for the RGV developed area that meets all state and national primary drinking water standards. Water quality from the water supply at Spring 4 currently meets national primary drinking water standards. However, the existing water supply may not be able to meet future demand and TCEQ standards for potable water. Based on current water quality data, the no action alternative would have negligible impacts to health and safety. None of the alternatives analyzed would have impacts greater than negligible on health and safety. Therefore, health and safety was dismissed as an impact topic in this EA.

Hazardous Materials

Numerous federal laws guide the management of hazardous materials. One of these laws is the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. This law provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The Superfund Amendments and Reauthorization Act (SARA) amended CERCLA. The Resource Conservation and Recovery Act (RCRA) gave EPA the authority to control hazardous waste from the "cradle to grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste.

Waste management and contamination issues are covered on page 105, Section 9.1.6 of NPS *Management Policies 2001* (NPS 2000a). This section states that NPS recognizes the far-reaching impacts that waste products, contaminants, and wasteful practices have, not only on national park resources, but also on biotic and abiotic resources elsewhere in the nation and around the world. The NPS will therefore demonstrate environmental leadership and serve as a model for others to follow in managing wastes and contaminants.

The potential for use and release of hazardous substances that may endanger public health or the environment is unlikely under the preferred alternative or the no action alternative. Therefore, hazardous materials were dismissed as an impact topic in this EA.

Waste Management

Construction activities would generate a small amount of solid, sanitary, and landscape/ vegetative waste; no hazardous wastes would be generated. Under the preferred alternative, all construction wastes would be temporarily stored, transported, and disposed of in approved disposal facilities in accordance with state and federal laws and regulations and NPS policies. The additional generation and disposal of wastes resulting from construction would have a negligible impact on waste management. Existing disposal facilities have sufficient capacity to accommodate these wastes. None of the alternatives analyzed would have impacts greater than negligible on waste management. Therefore, waste management was dismissed as an impact topic in this EA.

Traffic

Visitation to the park principally affects traffic on U.S. 385 from Marathon, Texas to the main park road and on Texas Route 118 from Alpine, Texas to the main park road. There is very little traffic on either of these roads. Construction activities associated with the preferred alternative would not appreciably alter traffic on these routes. None of the alternatives presented would have an effect on traffic. Therefore, traffic was dismissed as an impact topic in this EA.

Socioeconomic Environment

Construction activities associated with the preferred alternative would have short-term, beneficial but negligible impacts on the local economy due to short-term increases in employment opportunities and revenues for local businesses and government. A private construction contractor would be hired by the NPS to conduct all construction activities. Construction-related benefits to the local economy through wages, overhead expenses, material costs, and profits would last only the duration of construction and would be minimal. None of the alternatives analyzed would have impacts greater than negligible on the socioeconomic environment. Therefore, socioeconomic environment was dismissed as an impact topic in this EA.

Environmental Justice

According to the EPA, environmental justice is the fair treatment and meaningful involvement of all people; regardless of race, color, national origin, or income; with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people; including a racial, ethnic, or socioeconomic group; should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The preferred alternative would not have disproportionate adverse health or environmental effects on minorities or low-income populations or communities, as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (EPA 1996), because the project benefits all groups equally. None of the alternatives presented would have an effect on environmental justice. Therefore, environmental justice was dismissed as an impact topic in this EA.

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ALTERNATIVES CONSIDERED

CEQ regulations for implementing NEPA require that federal agencies explore and objectively evaluate all reasonable alternatives to the preferred alternative, and to briefly discuss the rationale for eliminating any alternatives that were not considered in detail. This chapter describes a range of reasonable alternatives including the no action alternative, the preferred alternative, and those that were considered and eliminated from further analysis.

NO ACTION ALTERNATIVE (ALTERNATIVE A)

CEQ regulations (40 CFR 1502.14) require the assessment of the no action alternative in NEPA documents. The no action alternative provides a basis for comparing the management direction and environmental consequences of the proposed action and must be considered in every EA. Under Alternative A, the NPS would not construct a chlorination building, all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system. The existing Spring 4 springbox would remain in its current condition and would continue to be used as the drinking water supply for the RGV. The RGV developed area has used a portion of the Spring 4 water supply since the late 1950s. Since it was listed as endangered in 1967, projects designed to modify spring outflows have been cognizant of Big Bend mosquitofish habitat requirements. The *Big Bend Gambusia Recovery Plan* has recognized that excess water not needed for the fish could be used for domestic use in the campground, but priority should be placed on habitat for the fish (USFWS 1984). Under Alternative A, Spring 4 would continue to provide the Big Bend mosquitofish with the warm water most optimal for Big Bend mosquitofish populations.

PREFERRED ALTERNATIVE (ALTERNATIVE B)

Figure 2 provides a detailed map of the project area and components of the project proposed under Alternative B. Under Alternative B, the NPS proposes to construct a chlorination building, all appurtenant water lines and accessories necessary to connect the new water well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system (Figure 2). ARCADIS (2005b) has prepared a Schematic Design Report, including engineering and design plans for the project in consultation with BBNP. Preliminary design details are included in the paragraph below.

Under Alternative B, the chlorinator currently located at the Spring 4 springbox would be removed. However, the existing water pipeline, springbox, and pumps would remain in case they need to be used in the future as an emergency back-up system. In the event of a failure of the new well that could not easily be repaired, the pumps could be operated under the existing system described under Alternative A and the water could be pumped to the new chlorinator building. The pumps at the Spring 4 springbox would be run on a periodic basis to ensure that they are operational in case they need to be used in an emergency situation.

Well

Test Well 3 (the Santa Elena well) will be converted to a water supply well during the new water supply construction. Conversion of the well to a water supply well will include installation of a submersible pump and liner in the well, and wellhead improvements consisting of a concrete sealing block, air vent, and vandal-resistant enclosure. The Santa Elena well is 798 feet deep with a static water level of 43.9 feet. In addition, the construction related to the well would include installation of 805 feet of a new overhead power line from the nearby existing line (Figure 2). A fence measuring approximately 16 feet by 30 feet would surround the new water well and an electrical panel (8 feet by 5 feet) would be located inside the fenced area. The radio telemetry system would consist of a pole near the existing water storage tank along

the existing trail (Figure 2). This pole would contain solar panels and an antenna for the transfer of data between the water well, storage tank, and chlorination building.

Transmission Pipeline

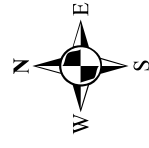
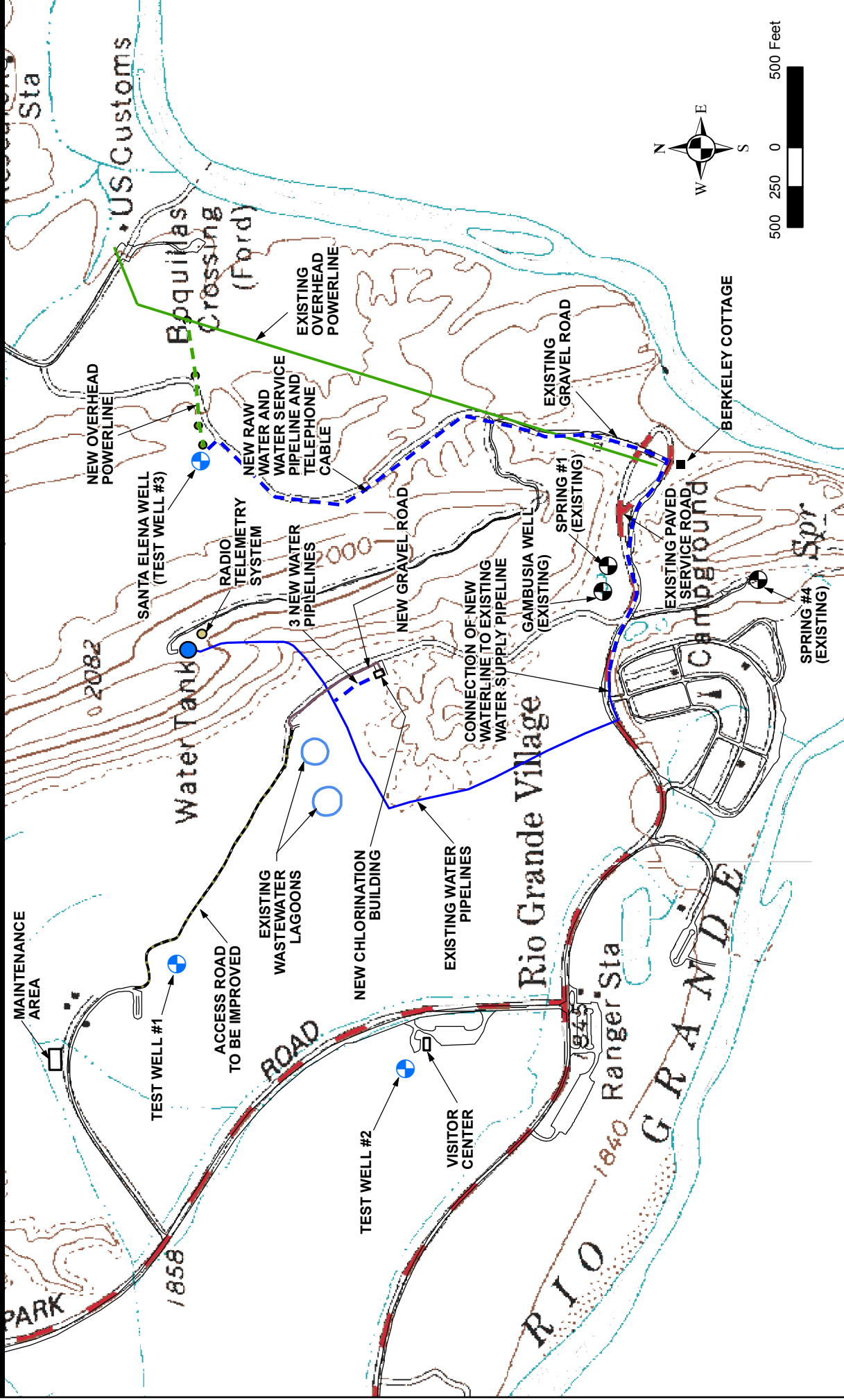
Water must be conveyed from the Santa Elena well to the chlorination building and then to the water storage tank. The existing water pipelines (Figure 2) should be in good condition because they were upgraded during a 2001 water pipeline replacement project. Therefore, these pipelines are available for use with the new water supply. Figure 2 shows new water pipelines following existing roads from the Santa Elena well to the existing supply pipeline, which would then convey the well water to the chlorination building site. The water pipelines will consist of 4,600 feet of 4-inch diameter raw water pipeline. A telephone cable and 1.5-inch diameter water service pipeline will also be installed in part of the same corridor for future service to the Barker Lodge. Installation of the telephone cable and water service pipeline would prevent the need for trenching this area for this future project and thus prevent future damage to the raw water pipeline in this narrow utility corridor.

Along the existing gravel roads, the construction corridor for the new water pipelines consists of an area of 8 feet outside the road on both sides of the road, except just north of the Berkley Cottage in the potential wetland area. The construction corridor will be confined to the width of the road at this point. The raw water pipeline would have a section of about 150 feet where it will be outside of the paved service road, running 3 to 10 feet from the north side of the paved service road at a parallel before connecting to the existing raw water pipeline. At the existing culverts along this paved road, the disturbance area will expand to 26 feet along the north side of the road.

Pipelines would also have to be constructed from the existing water pipelines to the chlorination building (Figure 2). These would include 600 feet of new 4-inch raw water, 4-inch treated water, and 4-inch tank recirculation pipelines. These new water pipelines would be constructed underneath or adjacent to existing roads or trails to minimize surface disturbance (Figure 2). The construction corridor consists of an area of 8 feet outside the road or trail on both sides. There is a section of less than 100 feet of these pipelines which will not following existing roads or trails, which will be 20 feet from an existing pipeline, and construction will be limited to a 30-foot width in this area.

Trenching operations would utilize a rock saw, backhoe, and/or trencher for excavation. The pipelines would be buried to a minimum depth of 24 inches. A linear construction corridor of approximately 5,300 feet, would be rough graded during installation of the replacement pipelines. All pipeline installation procedures, which primarily include clearing, trenching, pipe preparation and assembly, and backfilling, would be confined to this construction corridor. Construction vehicles and equipment would also be confined to the construction corridor and existing roads, and vehicle and equipment movement over the project area would be minimized to reduce soil compaction and damage to vegetation. Staging and stockpiling for construction would only occur at the service road to the Berkley Cottage, the RGV "Brush Pile", Hannold Draw staging area located about 5 miles north of Panther Junction, and other previously disturbed lands at the RGV water system construction site.

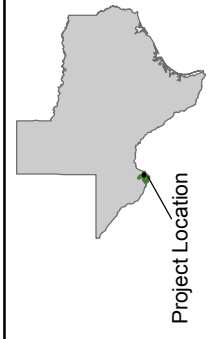
Backfilling and compaction would begin immediately after the pipe is placed into the trench. The construction corridor would be restored to pre-construction grading conditions. Any fill material needed beyond that produced from construction activities would be taken from approved sources outside the park. Any excess material generated from construction activities would be stockpiled in park storage areas for future use in approved projects or disposed of at approved sites outside the park.



Legend

- Existing Well
- New Well
- Road to be Improved
- New Gravel Road
- New Powerline
- New Water Pipeline
- Existing Powerline
- Existing Water Pipeline

Figure 2. Overall Site Plan Map



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Road Improvements

Two inches of gravel will be laid on top of the existing 15-foot-wide access road from the maintenance facility. The gravel will be added along 2,000 feet of this road. A new 800-foot gravel road would be constructed along an existing trail to the proposed chlorination building from the existing road (Figure 2). This gravel road will also be 15 feet wide. To prevent erosion and alteration of area hydrology, drainages formed by depressing the road grade will be constructed along the gravel road as it crosses the wide zone that currently experiences sheet-flow runoff. Both the existing road and the proposed new road are located in the park maintenance area that limits public access to visitors via park signage.

Chlorination Building

The location shown for the new chlorination building in Figure 2 is southeast of the existing wastewater evaporation pond area. This location is preferred because of its close proximity to the maintenance area, an existing power line, and existing water pipelines. The site offers an additional advantage of a flat grade road. The primitive road to the site from the maintenance area will be improved for better access (Figure 2). Because of its proximity to existing infrastructure it would limit potential impacts to resources. The chlorination building is a one-story building, measuring approximately 22 feet by 32 feet. The building will be split-face concrete block with a metal roof, and the colors will be selected to blend with the surrounding landscape. The metal roof will slope to the east to limit glare reflection towards the main road to the northwest. A hill conceals sight of much of the building from the main park road. It could only be observed from a short section of the main park road south of the tunnel. The chlorination building will be located adjacent to a power line. One power pole will have to be installed to connect the existing power line with the chlorination building.

The chlorination building will contain disinfection equipment to ensure TCEQ primary drinking standards for water quality are met. According to TCEQ requirements, disinfection equipment must have a capacity of at least 50 percent greater than the highest expected dosage and must be sized for the maximum treatment capacity. Two positive displacement sodium hypochlorite feed pumps will be required for redundancy. A day tank will be used for diluting sodium hypochlorite to a 0.5 to 1.0 percent solution. The hypochlorite feed pumps will pump the hypochlorite solution from the day tank. Adequate chlorine contact time will be achieved in the pipeline to the storage tank and inside the storage tank.

The 400,000-gallon ground storage tank is located 0.25 mile away and approximately 180 feet higher in elevation on a hill (Figure 2).

MITIGATION MEASURES OF ALTERNATIVE B

Measures to minimize or avoid adverse impacts to environmental resources as a result of Alternative B are listed below in Table 1. These measures would be implemented as part of Alternative B. To minimize or avoid impacts to resources, Alternative B would comply with NPS *Management Policies 2001* (NPS 2000a).

TABLE 1 MITIGATION MEASURES OF ALTERNATIVE B	
Resource Area	Mitigation
General Considerations	The NPS project manager would ensure that the project remains confined within the parameters established in compliance documents and that mitigation measures are properly implemented.
	All fencing, tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work site upon project completion.
Air Quality	Construction will be conducted in compliance with federal, state, and local air quality regulations.
Water Resources,	Best management practices would be used for sediment control during construction to avoid

TABLE 1 MITIGATION MEASURES OF ALTERNATIVE B	
Resource Area	Mitigation
Including Wetland Habitat	potential impacts to water quality. Sediment control measures could include silt fencing, temporary earthen berms, sediment traps, erosion check structures, and filters. Regular site inspections would be conducted during the construction period to ensure that sediment control measures were properly installed and are functioning effectively.
Soils	Heavy equipment would be kept within the construction zone to minimize soil compaction. Standard erosion control measures, such as silt fences, sand bags, etc. would be used, as necessary, to minimize any potential soil erosion. Revegetation of the disturbed construction areas with native plants will be the responsibility of the park.
Archeological Resources	Although unlikely, should unknown archeological resources be uncovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in consultation with the Texas SHPO. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.
Visual Resources	The chlorination building is a one-story building with a metal roof, and the colors will be selected to blend with the surrounding landscape. The location and orientation of the building will be selected to minimize visual resource impacts.
Health & Safety	Before on-site work begins, the contractor will submit for approval an accident prevention program.
Threatened, Endangered, Candidate, and Sensitive Species	The NPS would continue to monitor the Big Bend mosquitofish population within the existing Spring 4 pond and Spring 1 pond to ensure that construction activities are not adversely affecting the species. Currently, the ponds are monitored every few months on a volunteer basis, exceeding the biannual monitoring requirements under the <i>Big Bend Gambusia Recovery Plan</i> (USFWS 1984). The NPS would continue this monitoring in order to detect changes in water levels in both ponds. If some unpredictable and unforeseen circumstance occurs that indicates an adverse effect on the Big Bend mosquitofish, the NPS would consult with the USFWS before taking action under a future Section 7 consultation process.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with DO-12 (NPS 2001), the NPS is required to identify the “environmentally preferred alternative” in all environmental documents including EAs. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ. As stated in Section 2.7 (D) of the NPS DO-12 Handbook: “The environmentally preferred alternative is the alternative that will best promote the national environmental policy expressed in NEPA (Section 101(b)).” This environmental policy is stated in six goal statements, which include:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment that supports diversity and variety of individual choice without adversely affecting cultural resources;
5. Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life’s amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources (NEPA, 42 USC 4321-4347).

In summary, the environmentally preferred alternative is the alternative that not only results in the least damage to the biological and physical environment but also that best protects, preserves, and enhances historic, cultural, and natural resources.

No Action Alternative (Alternative A)

Alternative A is not the environmentally preferred alternative for the following reasons:

- Alternative A interferes with meeting goal number 1 because the park would not be meeting its trustee responsibilities for succeeding generations if it allows for the potential loss of Big Bend mosquitofish. Continued use of the Spring 4 hot spring for potable water could decrease available flows for this endangered fish species.
- Alternative A interferes with meeting goal number 2 because the existing water supply may not be able to meet future demand and TCEQ standards for potable water. TCEQ has expressed concerns that the Spring 4 hot spring is possibly under the direct influence of surface water. The spring would not be able to meet TCEQ standards for potable water if it is under the direct influence of surface water, without additional treatment to remove microparticulate contaminants that are typical in surface water supplies.
- Alternative A interferes with meeting goal number 3 because visitor safety could be at risk if the existing water supply does not meet TCEQ standards for potable water, without additional treatment to remove microparticulate contaminants that are typical in surface water supplies, and may not be able to meet future demand.
- Alternative A would not support goal number 4 because the natural aspects of our national heritage would be degraded with the potential loss of biological diversity (i.e., the Big Bend mosquitofish).
- The park currently allows for a good balance between population and resource use. Alternative A would neither contribute to nor interfere with meeting this goal.
- Alternative A would neither contribute to nor interfere with meeting goal number 6.

Preferred Alternative (Alternative B)

Alternative B is the environmentally preferred alternative for the following reasons:

- Alternative B contributes substantially to meeting goal number 1. This alternative would help to provide succeeding generations the benefit of the continued survival and sustainability of the wild population of Big Bend mosquitofish in the park.
- Alternative B contributes substantially to meeting goal number 2. The new water supply would be able to meet future demands and TCEQ primary standards for potable water.
- Alternative B attains the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.
- Alternative B provides for the preservation of important natural aspects of our national heritage without having a major effect on cultural resources.
- While the park currently allows for a good balance between population and resource use, Alternative B would neither contribute nor interfere with meeting this goal.
- Alternative B would neither contribute nor interfere with meeting goal number 6.

ALTERNATIVES CONSIDERED BUT DISMISSED

The following alternatives were considered, but dismissed from further analysis. Under DO-12 (NPS 2001), reasons for eliminating alternatives can include:

- Technical or economic infeasibility.
- Inability to meet project objectives or resolve need.
- Duplication with other, less environmentally damaging or less expensive alternatives.
- Conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement.
- Too great an environmental impact.

Directional Drilling

A modification of Alternative B was considered. The NPS considered a shorter routing for the water supply pipeline that would include 1,000 to 1,200 feet of the pipeline being constructed by directional drilling underneath the hill upon which the water storage tank is located. A concern with this directional drilling approach would be the inaccessibility of the pipeline for traditional pipeline repairs and the requirement to replace the entire length of the directional drill pipeline if a significant leak ever occurred in this portion of the pipeline. This would likely require hiring a construction company to replace the entire length of the directional drill pipeline, whereas leaks in a traditional trench pipeline can be repaired in the particular location by the park's maintenance staff using traditional pipeline repair methods. This alternative was eliminated because of:

- Technical or economic infeasibility.
- Duplication with other, less environmentally damaging or less expensive alternatives.
- Too great an environmental impact.

Test Well 2

This test well was drilled in an alluvial aquifer near the RGV visitor center (Figure 2). This well is at moderate risk of surface water contamination. Drinking water from this source would require filtration to remove microparticulate contamination and treatment. Also, the water from this well is worse than well 3 in regards to secondary constituents and has concentrations of TDS, chloride, sulfate, and manganese that are above TCEQ secondary standards. The treatment system would be complex for Test Well 2 and could consist of:

- Oxidation and filtration to remove manganese,
- Chlorine removal to prevent damage of the membranes,
- Cartridge filters for microparticulate removal,
- Membrane treatment to reduce the secondary contaminants, and
- Disinfection.

Because the water is lower quality than well 3 and a more complex treatment system would be required for this well, which results in a costly operation and maintenance program and potential environmental and health and safety hazards associated with the high waste stream volume for the treatment system. This alternative was eliminated because of:

- Technical or economic infeasibility.
- Duplication with other, less environmentally damaging or less expensive alternatives.
- Too great an environmental impact.

SUMMARY OF ALTERNATIVES AND COMPARISON OF IMPACTS

Table 2 summarizes the degree to which Alternatives A and B meet the purpose, need, and objectives. Table 3 compares the potential environmental impacts resulting from Alternatives A and B. Potential impacts are provided according to environmental resource topic. The *Environmental Consequences* section of this EA discusses in detail these potential impacts by resource topic.

TABLE 2 ALTERNATIVES COMPARISON DEVELOP NEW DRINKING WATER SYSTEM	
Alternative A No Action	Alternative B Preferred Alternative
Under the no action alternative, no new water system would be constructed. Spring 4 would continue to be used as the source of potable water for the developed area of RGV. Spring 4 would also continue to provide the Big Bend mosquitofish with the warm water most optimal for the population.	Under the preferred alternative, a chlorination building, water lines to connect the new water well to the existing storage and distribution system, and a radio telemetry system for remote monitoring and operation of the water supply system would be installed. The chlorinator at the Spring 4 springbox would be removed, but the rest of the existing system would remain in place in the event that it needed to be used as an emergency back-up water supply.
<i>Meets Project Objectives?</i> No. Continuing the existing conditions would not meet the need for a reliable potable water supply system for RGV. In addition, continued diversion of a portion of the spring flow for the water supply would affect the local hydrology and reduce the flows of warm water available for the Gambusia, particularly in times of drought.	<i>Meets Project Objectives?</i> Yes. This alternative would result in a reliable potable water supply system for RGV. The preferred alternative would alleviate demands on Spring 4 and allow more water to be diverted to natural habitats. The alternative would also reduce the possible drawdown of warm groundwater that feeds Spring 4 and allows for the continued existence of <i>Gambusia</i> , particularly in times of drought.

TABLE 3 SUMMARY COMPARISON OF IMPACTS		
Impact Topic	Alternative A	Alternative B
Soils	Alternative A would have no impacts on soils.	Alternative B would result in short-term, minor, localized, and adverse effects on soils due to soil disturbance and compaction. A small area of soils where the chlorination building, pipeline, power poles, and new road are proposed would be permanently altered; however, long-term impacts would be minor and localized given the size of the area that would be affected.
Water Resources, Including Wetland Habitat	Overall impacts to water resources, including wetland habitat, due to the potential for reduced flows and reduction in water quality under Alternative A would be long-term, localized, moderate, and adverse.	Construction activities under Alternative B would have short-term, negligible, localized, adverse impacts on water quality. Removal of the chlorinator at the existing springbox at Spring 4 would provide a long-term, localized, moderate, and beneficial effect by reducing the possibility of contaminating surface water or groundwater with chlorine. Impacts from periodic maintenance of existing infrastructure to be used as an emergency back-up system would be similar to that of use of the existing water supply system described under Alternative A. However, adverse impacts would be less because the maintenance would be periodic and use of the existing system would only occur during an emergency. Development of the Santa Elena well for domestic water use for the RGV developed area would primarily have beneficial impacts by alleviating demands on Spring 4 and allowing for more water to flow to natural habitats. Overall impacts to water resources, including wetland habitat, under Alternative B would be long-term, localized, minor, and beneficial.

TABLE 3 SUMMARY COMPARISON OF IMPACTS		
Impact Topic	Alternative A	Alternative B
Vegetation	Long-term, localized, minor, adverse impacts on vegetation would occur under Alternative A from the possible loss or reduction of wetland/riparian vegetation.	Alternative B would have short-term, negligible, localized, adverse impacts on vegetation that would occur from construction. Long-term, localized, minor, beneficial impacts on vegetation would occur under Alternative B by reducing the potential of loss or reduction of wetland/riparian vegetation associated with Spring 4.
Wildlife	Long-term, localized, minor, adverse impacts on wildlife would occur under Alternative A if diversion of a portion of the spring flow for water supply continues, resulting in the loss or reduction of the associated aquatic and wetland habitat.	Alternative B would have short-term, negligible to minor, localized, adverse impacts on wildlife in the vicinity of the project area. Long-term, localized, minor, beneficial impacts on wildlife would occur under Alternative B by reducing the potential of loss or reduction of wetland/riparian habitat associated with Spring 4.
Threatened, Endangered, Candidate, and Sensitive Species	Alternative A “may affect, is not likely to adversely affect” the federally endangered Big Bend mosquitofish and its habitat in the park. In addition, if diversion of a portion of the spring flow for water supply continues, resulting in the loss or reduction of the associated aquatic and wetland habitat, under Alternative A, long-term, minor, localized, adverse effects on the common black hawk could occur.	Construction activities under Alternative B would have no short-term impacts on the Big Bend mosquitofish. Alternative B would result in long-term beneficial impacts on the Big Bend mosquitofish and its habitat by accruing the advantages of a greater available water supply and reducing the potential for groundwater or surface water contamination with chlorine by removing the chlorinator at the Spring 4 springbox. Alternative B would be consistent with the conservation and recovery objectives for the species outlined in the <i>Big Bend Gambusia Recovery Plan</i> (USFWS 1984). Impacts to the Big Bend mosquitofish and the common black hawk from periodic maintenance of existing infrastructure to be used as an emergency back-up system would be similar to those impacts described under Alternative A. However, adverse impacts would be less because the maintenance would be periodic and use of the existing system would only occur during an emergency. Overall, Alternative B is anticipated to result in negligible to minor, localized, adverse impacts on the common black hawk in the short-term. Localized, minor, beneficial impacts on the common black hawk would be anticipated over the long-term by maintaining existing suitable prey habitat in the Spring 4 pond.
Archeological Resources	Alternative A would result in no impacts to known archeological resources within the project area.	Alternative B would have no impacts to known archeological resources because the known sites would be avoided. Any adverse impacts to newly discovered archeological resources would be long-term or permanent and minor to moderate in intensity.